

### **ABSTRACT OF THE DISCLOSURE**

A method is disclosed for using a spawning agent and a steroid to stimulate gonadal development, oocyte maturation, and meiotic synchrony in oysters and other bivalves. Advantages of the novel technique include a decrease in the variability of fertilization among different individuals, a decrease in the variability of larval production by synchronizing gamete maturation within a population, the ability to mature and spawn broodstock without sacrificing the animals, to conserve and maintain genetic lines, and the ability to improve cross-breeding programs, with or without the use of transgenics, by repeated spawning of individuals. The method may be used, for example, in oyster hatchery production, with an emphasis on conservation of broodstock. The invention allows the successful and repeatable breeding of either diploids or polyploids, selective breeding, and the breeding of transgenic oyster lines, all without the need to sacrifice the founder animals. The animals are first treated with estradiol-17 $\beta$  or an agonist. The estradiol-17 $\beta$  or agonist promotes the maturation of oocytes, so that mature oocytes are then released with high meiotic synchrony in response to subsequent induced spawning stimuli such as serotonin.